
Vision 21 Workshop for Virtual Simulation

W. Fiveland, spokesperson

Mike Bockelie, Chairman

Mark Bryden/ Bill Michels, Recorders

Participants

- Janos M. Beer
- Mike Bockelie
- Mark Bryden
- Woodrow Fiveland
- Christopher Hadad
- Alasdair Heath
- Dale Keairns
- David Lewandowski
- Russ Maxwell
- William Michels
- John Molburg
- James Moseley
- Thomas O'Brien
- Sreekanth Pannala
- John Plunkett
- Ashok Rao
- Paul Raptis
- Nelson Rekos
- Adel Sarofim
- Guodong Sun

Breakout session - Day 1

- Model development issues
- Information Exchange / Communication issues
- Government roles

Development issues- barriers

- Design/operation of technology modules
 - technology is not developed
 - models not widely available or available at all
 - models are too complex
- What do technology developers want?
 - Timely and accurate solutions
 - flexibility and robustness
 - plug and play
 - visualization

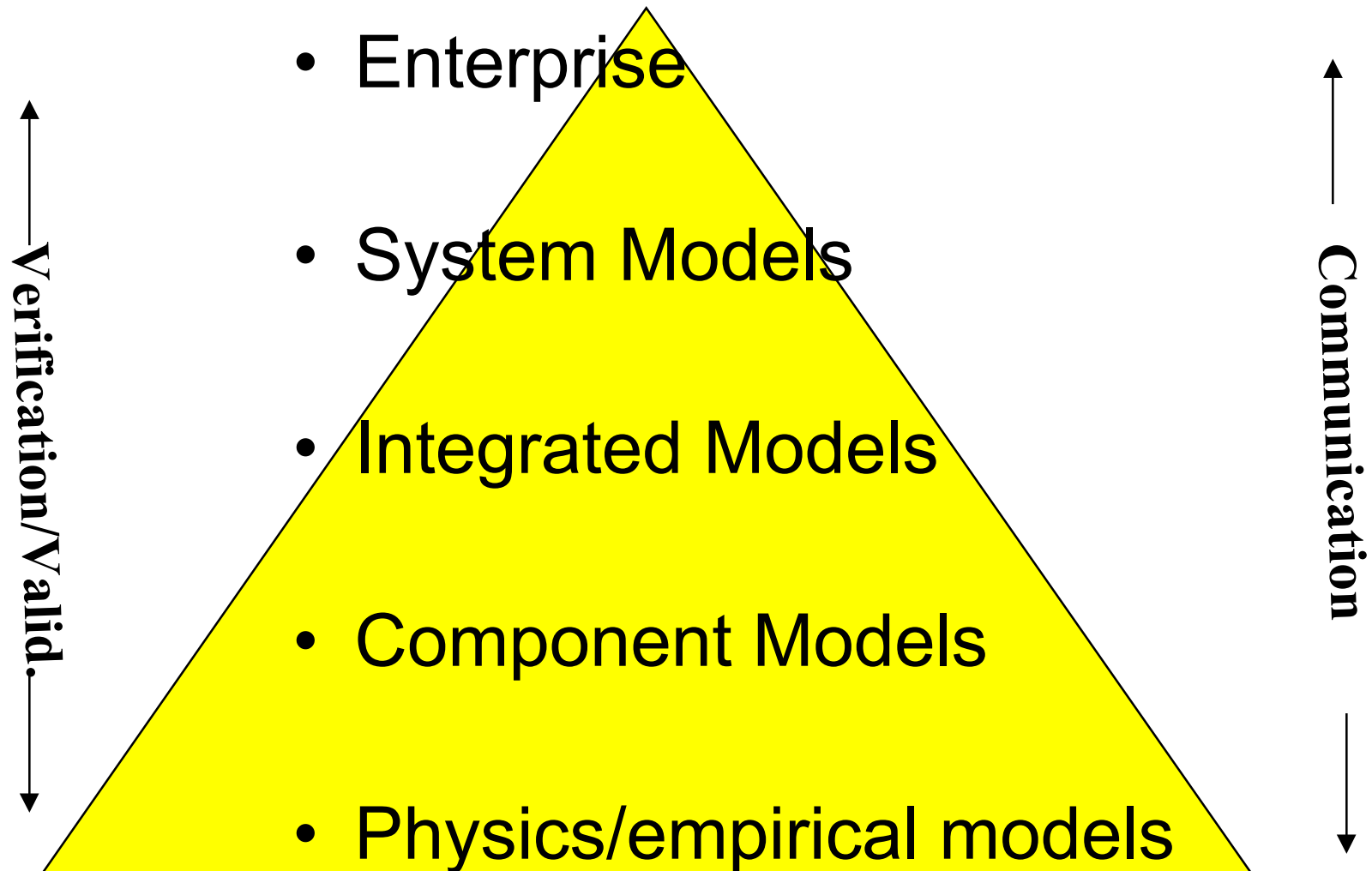
Development issues- barriers

- What do Component designers want ?
 - timely solutions /optimization tools
 - mechanistic models (currently poorly understood physics)
 - transient models (startup/shutdown)
- What do Plant designers want ?
 - poorly defined component models
 - coupling of components / impedance matching
 - dynamic modeling

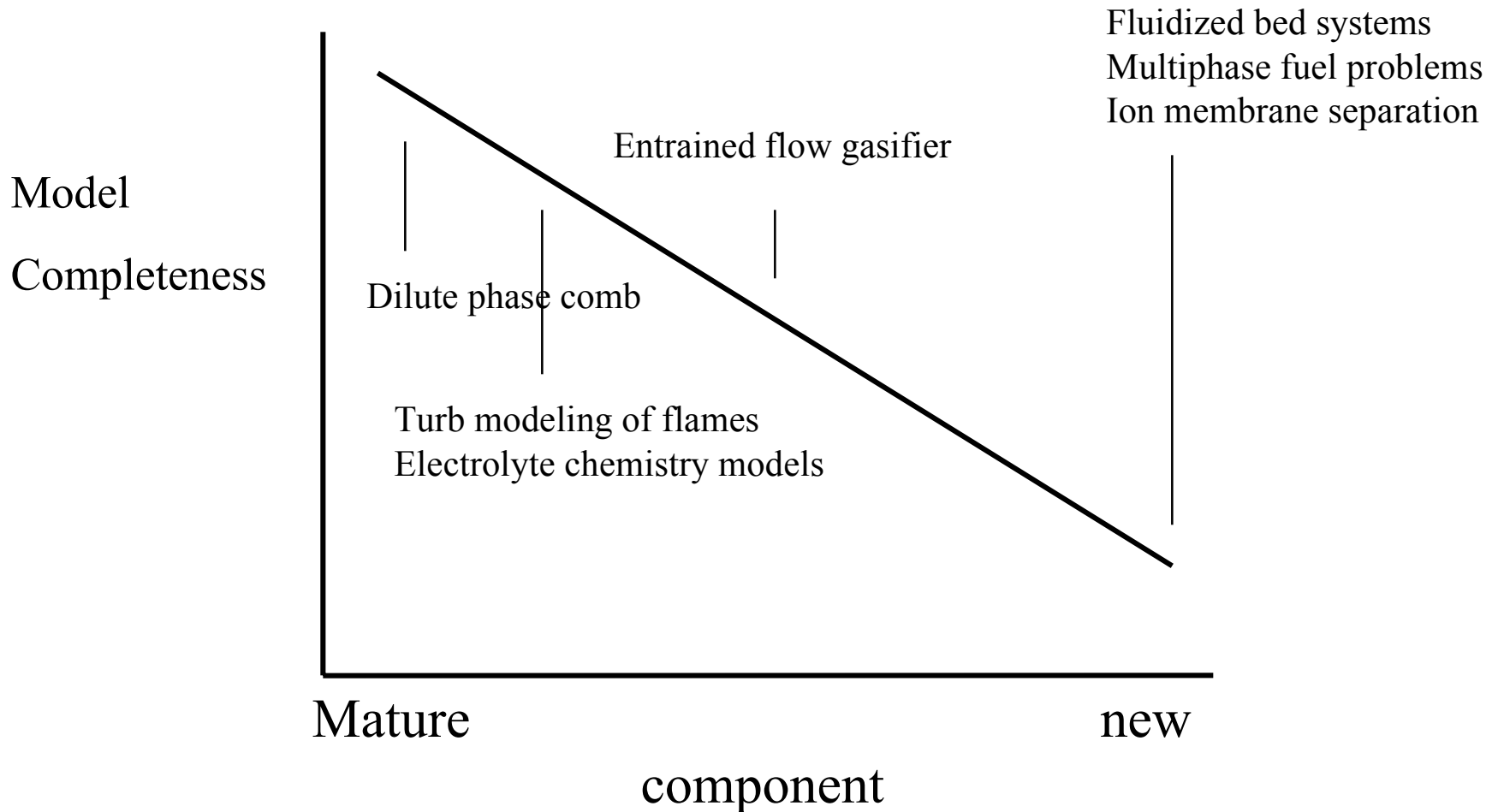
Development issues- barriers

- Barriers to design/operation of plant operations
 - feedback loop to inform
 - market driven product mix
 - focus on revenue producers
 - control models
 - information availability
 - inform operator of system status/problems/fixes

Hierarchy of models



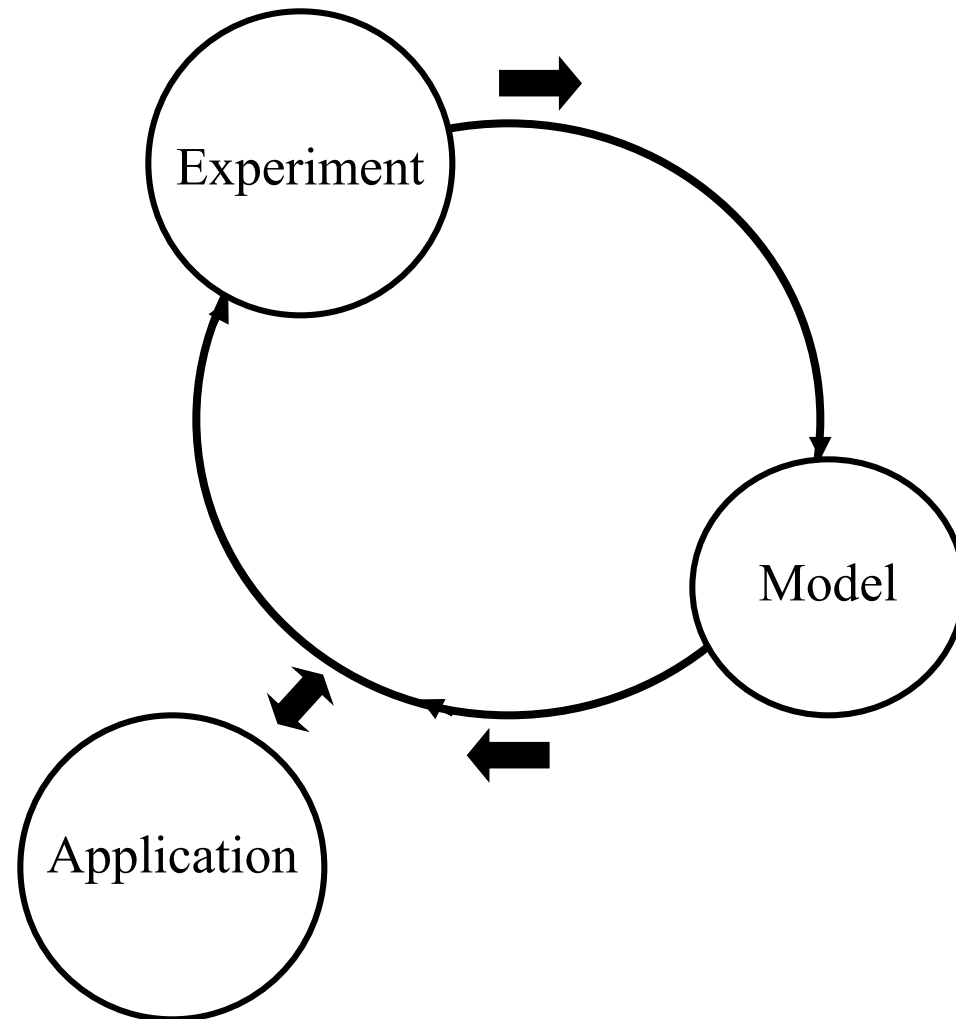
Development issues- barriers



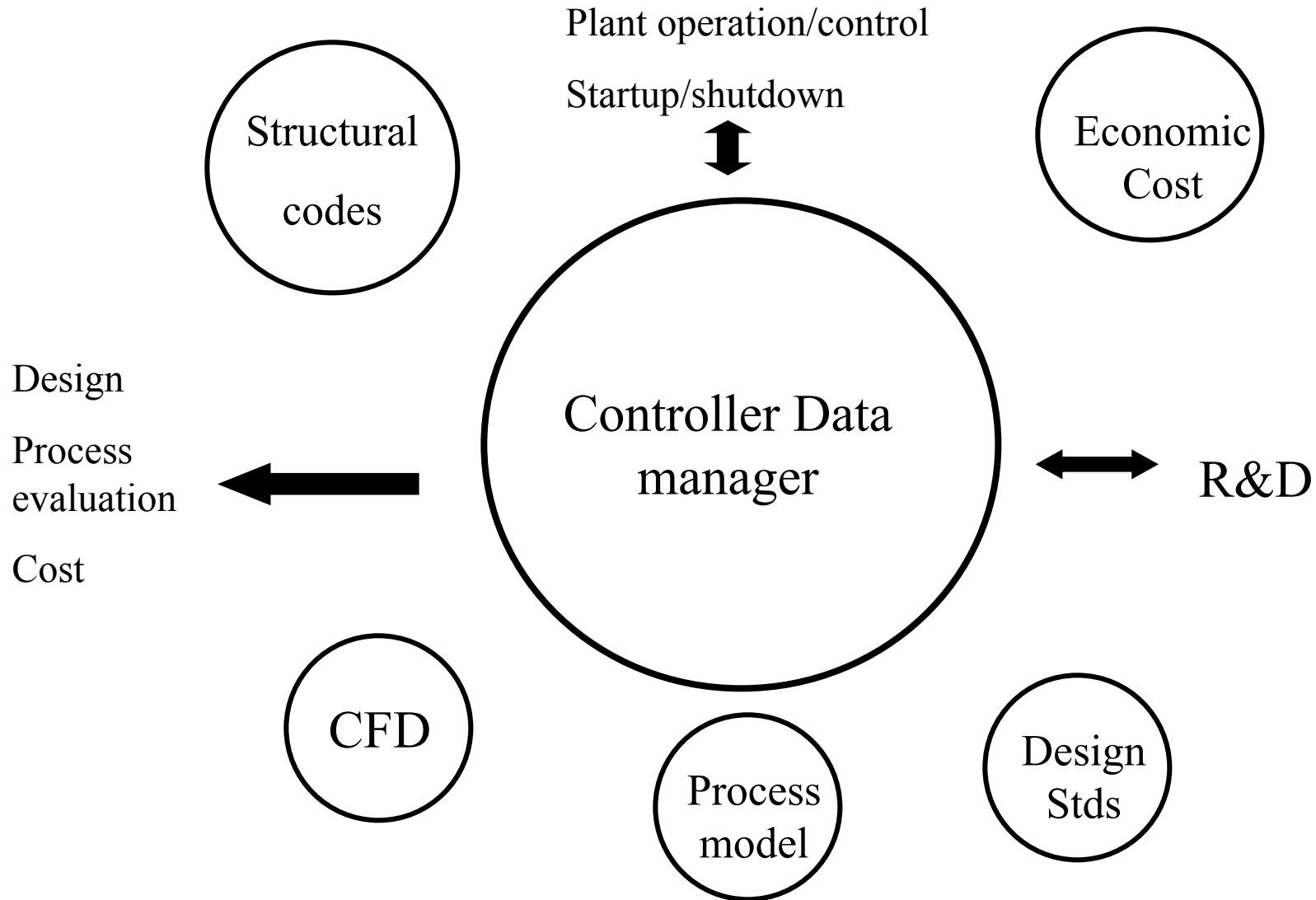
Need for improved data

- **Component**
 - burners near field
 - gasifiers
 - ultra efficient treatment processes
 - halides, particulate (ppb)
- **Physical**
 - mechanistic - multi phase chemistry
 - mineral matter, slag
 - char volatilization
 - High pressure effect on combustion kinetics
 - Slagging
- **I/O information**
 - visual interface
 - data security
 - micro-macro coupling
- **Coupling**
 - slagging/CFD
 - heat recovery from slag
 - by product production and treatment

Development and validation procedure



Plant design



Info Exchange / Communication issues

- During model development
 - proprietary models are “out of bounds”
 - shared developmental information via “Web: the net” - info available to all
 - open source software
- During design
 - via the net / workshops / training
 - release info w/o release of proprietary info.
- Intellectual property - Wow!

Government role

- DOE needs to develop models for
 - combustors / gasifiers
 - fuel cells
- How:
 - DOE needs to formulate/coordinate a modeling PLAN ==> research plan
 - cooperative effort
 - universities / laboratories / industry / doe
- Fund writing a modeling plan(s)

Government role

- CFD is only one element of V 21 units
- Process model development
- Need to develop interface architecture usable by all
 - CFD
 - proprietary codes
 - data bases
- Cost models
- Virtual software